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ABSTRACT

The main purpose of this study was to reveal Turkish pre-service science teachers' attitudes toward science and science teaching by using a Turkish translation of the latest version of Science Teaching Attitudes Scale (STAS-II) by Moore and Foy (1997). The sample size of the study was 612 freshman, sophomore, junior, and senior science education major students of four different teachers colleges located in different parts of Turkey. The reliability of the Turkish translation of the STAS-II was found to be 0.80 with the test-retest method. There is a significant mean difference between class levels (p=0.027). Teachers colleges and gender of students do not show significantly mean differences based on the STAS-II scores. On the other hand, the subjects of families having higher level incomes had statistically significant higher mean on attitudes toward science and science teaching than other subjects. In the result, the uniqueness of a nationwide science curriculum and the unification of the educational system seem to develop substantially similar attitudes among pre-service science teachers in Turkey. (Author)

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**A Study of Undergraduate Science Education Major Students' Attitudes towards Science and Science Teaching, and Relations with Several Socio-demographic Factors at Four-year Teachers Colleges in Turkey**

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The main purpose of study was to reveal Turkish pre-service science teachers' attitudes toward science and science teaching by using a Turkish translation of the last version of Science Teaching Attitudes Scale (STAS-II) by Moore and Foy (1997). The sample size of study was 612 freshman, sophomore, junior, and senior science education major students of four different teachers colleges located in different parts of Turkey. The reliability of the Turkish translation of STAS-II was found to be 0.80 with the test-retest method. There is a significant mean difference between class levels ($p=0.027$). Teachers colleges and gender of students do not show significantly mean differences based on STAS-II scores. On the other hand, the subjects of families having higher level incomes had statistically significant higher mean on attitudes toward science and science teaching than other subjects. In the result, the uniqueness of a nationwide science curriculum and the unification of the education system seem to develop substantially similar attitudes among pre-service science teachers in Turkey.

**A Study of Undergraduate Science Education Major Students' Attitudes towards Science and Science Teaching, and Relations with Several Socio-demographic Factors at Four-year Teachers Colleges in Turkey**

**Introduction**

Since this study is a cross-cultural study, it marks the first time a translated version of STAS-II was conducted on future science teachers of Turkey. Turkey, like other developing countries, pays great attention to education, and a majority of Turkish people believe reaching the level of developed countries can only be accomplished through education, specially science education. In this sense, teacher education and preparation has a special meaning for Turkey. However, there is very little knowledge about science teachers' attitudes toward science and science teaching or how science teachers and teachers candidates perceive science and teaching science. This does not mean how much they know about science content. For this reason, the findings of the study will be useful for Turkish teacher preparation in general and science educators in particular.

According to Kobella (1988), the affective domain related to science education is mainly concerned with attitudes related to science. Therefore, one of the main purposes of science education is to develop positive attitudes toward science and scientist. As a result, many teacher preparation programs emphasize changing of their pre-service science teachers' attitudes positively toward science and science teaching. In the past, science teaching in secondary schools was for the selected students who wanted to learn and make a career in a science area. However, in the USA National Science Education Standards (1996), one of the important aims is to teach "science for every one and to create scientifically literate citizens", but escaping from science classes is still the norm worldwide. For example, Baykul (1990) found that Turkish students' attitudes toward science and mathematics courses substantially decreased from Grade 5 through Grade 11. Students complained that the science courses were not useful, that the science and mathematics courses were extremely difficult, and that their math and science teachers had very negative attitudes.

Schwirian (1967) stated that attitude toward science is the basis of acceptance and support of science or the basis of rejection of science and scientific activities in a society. Therefore, the decline in attitude toward science may result in the decrease of scientific research support, for today's students will be tomorrow's scientists and decision-making persons in their society. In other words, students who have a positive attitude toward science are more likely promote science and scientific research in a country (Gieger, 1973). Consequently, countries like Turkey need scientifically literate citizens. To achieve this goal we must examine the attitudes of our science teachers.

**Methods and Procedures:**

Instrument to be used

The Science Teaching Attitude Scale II (STAS-II) was used in this research. STAS-II (Moore, 1997) was originally prepared by Moore in 1973 as STAS. It was an extension of Scientific Attitude Inventory (SAI) by the same author. Both attitude tests were used in different schools and colleges in order to measure and assess students' attitudes toward science. Later, under some critiques, these tests were revised and the number of questions reduced. The most important revised part of

these tests was to put in a neutral option. The first versions of the tests did not have this option. Also, these tests were translated to Hebrew, Thai, and Spanish languages (Moore and Foy, 1997). It was necessary to translate STAS-II to Turkish in order to use for this research. For this purpose, the researcher whose native language is Turkish translated the instrument to Turkish. It was checked by researchers whose native languages are Turkish but are studying and teaching in the US universities and are at least at the graduate level in English language and science. The final STAS-II Turkish translation was then backtranslated to English by the same pool of researchers to verify accuracy. Consequently, after both sides agreed with the final translation of STAS-II, the test was ready to be used in science education departments of Turkish Teachers Colleges. STAS-II has 60 statements related to science and science teaching. This likert-type scale test consists of 30 positive and 30 negative statements toward science and science teaching. They are classified under eight main sub-scales and each sub-scale has two part sub-scales as positive (A) and negative (B) parts, additionally, so that the total number of sub-scales is 16. All statements are assigned to 16 sub-scales. Due to the difficulties of assessing an attitude toward a subject, the author of STAS-II prepared more than one statement for each sub-scale to understand a person's attitude. In addition to STAS-II, some demographic questions, for instance, age, family income, gender, etc., were added to the test in order to examine how variables effect attitudes toward science and science teaching and the relationships of variables.

**Data Gathering and Time Frame**

To collect data for this research, students were asked to fill out the questionnaire during class sessions with permission of the course instructor and department head or college dean. Before conducting the research, a letter was sent to all four teachers' college deans for their permission and to explain the purpose and importance of this research. Following such permission, the researcher traveled to Turkey and visited the four teachers colleges. Generally, the time period for each institution was approximately one week so that the total time for the research was one month. During the class period, the written questionnaires were distributed to each respondent who had 60 minutes to answer the questionnaire.

**Statistical Procedure**

The study was analyzed under cross-section or between subjects of three factors (gender, years, and teachers colleges) ANOVA and multiple regression analysis for several socio-demographic factors' relationships with attitudes toward science and science teaching (" level 0.05). When statistically significant factors or interactions were found, post-hoc test by using Tukey test and simple main effect test followed.

**Participants**

Information was provided by Turkish teachers college students whose majors were science education. Currently, in Turkey there are 70 universities both public and private. Forty of these universities have teachers college or education colleges. Some of these universities have different teachers colleges, such as vocational teachers colleges, and technical teachers colleges. For example, Gazi University located in Ankara-Turkey has five different teachers colleges whose graduates can become high school and primary school teachers, and vocational and technical high school subject teachers. In addition to these teachers colleges in Turkey, science and art,

engineering, and theology colleges graduates are able to become teachers in elementary and secondary schools by taking additional education courses (educational psychology, sociology, etc.). As can be seen, different colleges provide teachers to schools in Turkey. However, since 1993 in addition to biology, physics, , chemistry, and mathematics education departments, some teachers colleges have established science education departments in order to fill the shortage of science teachers especially in primary schools. In these schools, science is taught as a single course covering biology, physics, earth science, and chemistry contents. In August 1997, compulsory education was increased from five years to eight years. For this reason, remaining teachers colleges began to open science education departments or merging biology, chemistry, and physics education departments under a single science education department. Currently, seven public universities have science education departments under teachers or education colleges. Although seven universities have such a department, only four of them had senior level students in science education departments in 1998. The remaining Selcuk, Inounu, Balikesir universities have newly established science education departments. Therefore, they were eliminated from the study, only the remaining Gazi, Dokuz Eylul, Karadeniz Technical and Ataturk Universities' education colleges were chosen for this study. Six-hundred and twelve students who ranged from freshman to senior were selected from the four teachers colleges.

**Summary of Some of Findings and Discussion**

Moore and Foy published reliability and validity on the new STAS-II in 1997. However, the Turkish translation of STAS-II had to be tested for its reliability. By using test-retest method, the reliability of the Turkish version of STAS-II was found to be 0.80. The validation of the Turkish STAS-II was checked by a group of panel judges before using the test. Overall scores indicate that pre-service Turkish science teachers have positive attitudes toward science and science teaching. Tables 1 and 2 show the means and three-way ANOVA results of Turkish pre-service science teachers' attitudes toward science and science teaching.

Table 1

Three-way Analysis of Variance by University, Gender, and Class Level on Attitude toward Science and Science Teaching

| Source | SS | df | MS | F | Sig. |
|---|---|---|---|---|---|
| UNIVERSITY (A) | 215.25 | 3 | 71.75 | .826 | .480 |
| GENDER (B) | 2.21 | 1 | 2.21 | .025 | .873 |
| CLASS (C) | 813.23 | 3 | 271.08 | 3.121 | .026* |
| AxB | 642.54 | 3 | 214.18 | 2.466 | .061 |
| AxC | 816.6 | 9 | 90.73 | 1.045 | .403 |
| BxC | 72.14 | 3 | 24.05 | .277 | .842 |
| AxBxC | 643.4 | 9 | 71.49 | .823 | .595 |
| Error | 50371.14 | 580 | 86.85 | | |
| Total | 24760797.87 | 612 | | | |

*P<0.05

After getting the results of the test, between class levels (freshman, sophomore,

junior and senior), there was a significant difference (p=0.026). The following post-hoc test showed that mean differences of upper class levels were significantly different from those of low class levels. One of the reasons may be the number of science courses increasing from freshman to senior and another reason could be science teaching method courses taught in upper class levels. The remaining two null hypotheses, The differences between universities and gender, were not significant and therefore were not rejected. The students who study in different universities as science education majors do not have significant mean differences, although the chosen universities for this research are located in the different parts of Turkey. In the Table 2, the relationships of several socio-demographic factors with the attitudes toward science and science teaching were reported.

Table 2
Summary of Findings of Multiple Regression Analyses of Relationships between Attitudes of Pre-service Turkish Science Teachers toward Science and Science Teaching and Several Socio-demographic Factors

| Section | | SS | df | MS | F | Sig. | R | $R^2$ |
|---|---|---|---|---|---|---|---|---|
| Percentage level in science scores | Regression | 675.76 | 4 | 168.94 | 1.860 | .116 | .110 | .012 |
| | Residual | 55128.14 | 607 | 90.82 | | | | |
| | Total | 55803.90 | 611 | | | | | |
| Geographic regions | Regression | 526.39 | 6 | 87.73 | .960 | .451 | .097 | .009 |
| | Residual | 55277.50 | 605 | 91.37 | | | | |
| | Total | 55803.90 | 611 | | | | | |
| Income levels of their families | Regression | 1217.20 | 3 | 405.73 | 4.519 | .004* | .148 | .02 |
| | Residual | 54586.70 | 608 | 89.78 | | | | |
| | Total | 55803.90 | 611 | | | | | |
| Education levels of their fathers | Regression | 418.58 | 5 | 83.72 | .916 | .470 | .148 | .02 |
| | Residual | 55385.31 | 606 | 91.39 | | | | |
| | Total | 55803.90 | 611 | | | | | |
| Education levels of their mothers | Regression | 203.91 | 5 | 40.78 | .444 | .817 | .060 | .004 |
| | Residual | 55599.99 | 606 | 91.75 | | | | |
| | Total | 55803.90 | 611 | | | | | |

*P<.05

Subjects whose families having higher income showed significant relationship with attitudes toward science and science teaching. The remaining socio-demographic factors did not have significant relationships with attitudes toward science and science teaching. These results could be one of the outcomes of unique curriculum in nationwide and the unification of education system in Turkey.

**References**

Baykul, Y. (1990). Ilkokul Besinci Siniftan Lise ve Dengi Okullarin Son Siniflarina Kadar Matematik ve Fen Derslerine Karsi Tutumda Gorulen Degismeler ve Ogrencilerin Secme Sinavindaki Basari ile Iliskili Oldugu Dusunulen Bazi Faktorler [To What Extent the Students' Attitudes Towards Mathematics and Science Subjects Were Changed in the Turkish Schools in Grades Five through Eleven, the Factors Which Might Have Some Significant Relation with the Student Performance in Student Selection Exam]. Ankara,Turkey: OSYM Yayinlari.

Gieger, M. M. (1973). A study of scientific attitudes among junior college students in Mississippi. Unpublished Doctoral Dissertation, The University of Southern Mississippi, Mississippi.

Koballa, T. R. (1988). Attitude and related concepts in science education. Science Education, 72, 115-126.

Moore, R. W. (1973). The development, field test, and validation of scales to assess teachers' attitudes toward teaching elementary school science. Science Education, v:57, 271-278.

Moore, R. W., & Foy, H. L. R. (1997). The scientific attitude inventory: A revision (SAI-II). Journal of Research in Science Teaching, 34, 327-336.

Schwirian, P. N. (1968). On measuring attitudes toward science. Science Education, 52, 172-179.